TREES
Magazine

Prunus Sargenti in Bloom at the Arnold Arboretum

SIXTH WESTERN SHADE TREE CONFERENCE—Oakland, Calif.

LIGHTNING PROTECTION FOR TREES—*A. Robert Thompson*

GROWTH FEATURES OF Q. AGRIFOLIA—*D. T. MacDougal*

April, 1939 A Quarterly Journal 25 Cents

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ALONG THE WAY

■ *Spent an interesting afternoon photogging with O. V. MATTHEWS of SALEM, OREGON. Many of the fine photos in Eliots "Forest Trees of the Pacific Coast" came from his camera.*

* * *

■ *BILL LIGHT, DAYTON'S HUSTLING ARBORIST, spent a couple months polishing up on his tree preservation knowledge under the able tutelage of KARL DRESSEL at MICHIGAN STATE COLLEGE.*

* * *

■ *WALTER KIPLINGER, City Forester of MARSHALL, Mich., sent in the accompaning pic and note: "I noted with deep envy in*

your January issue on page 3 where FRED ROEWEKAMP of the LOS ANGELES Park Department succeeded in securing several witnesses who had seen a crew employed by a sign board company destroying trees. I was not so fortunate myself. I have no idea who could possibly have cut down a row of nice elms planted on Highway U. S. 12 just West of MARSHALL, Michigan, by HAROLD C. BROOKS, of Marshall, a lover of trees and beauty. Unfortunately, the trees blocked the view of the artistic signboards shown in the illustration and something happened to them. I wrote to both the billboard company and the hotel, but received no answers to my letters. This neglect was rather ill-advised on their part, I believe, for a great many people believe that the way to discipline a signboard company is to turn the heat on the advertiser, and I am afraid that a great many sincere lovers of trees driving to the National Shade Tree Conference this summer will avoid stopping at this particular hotel."

* * *

■ It's good news to hear that PERCY BROELL has been chosen to succeed the retired JOHN MORLEY as SAN DIEGO'S SUPERINTENDENT OF PARKS.

■ *Showed 'DIGE WHITAKER, ..ASST. STATE LANDSCAPE ENGINEER, my favorite tree t'other day. It's in full bloom now and has been for a month—started in December. It's ERYTHRINA CAFFRA (tropical) and I still think some Park Supt. can make his city and himself famous by planting several streets to this CORAL tree. If possible pick a winding street—at least an eight foot parkway—not too particular about soil—likes water, but stop irrigation in October to throw flowers—plant trees at least 50 feet apart—Do this and some city will have the finest arboreal display in the world.*

* * *

■ TOM HEATON, Chairman of Local Arrangements for the Oakland 6th WESTERN SHADE TREE CONFERENCE, dropped in and seemed satisfied that the turnout would be the biggest yet.

* * *

■ *CLARENCE WACHTEL informs us that WISCONSIN arborists are soon to present a certified arborist bill to their legislators. He says they patterned closely on the one presented recently in California.*

* * *

■ A happy note the other day came from BOB WEAKLEY. He's rarin' to go again—and WEAKLEY speaking, that means a lot of going. Writing from Palm Beach, Bob says he, BOB THOMPSON, NORM ARMSTRONG and HOLLIS (LIME) HOWE broke all their resolutions about getting in a little fishing and swimming after the SOUTHERN SHADE TREE CONFERENCE. "Buzzard like," they talked LEGISLATION, and, of all things, TREE PRESERVATION.

* * *

■ That cheering and shouting in the vicinity of COLUMBUS, OHIO, February 17th, wasn't the Ohio State cheering section warming up for next football season—no, sir! It was PAPA CHADWICK and 6 pound 12 ounce BARBARA ALICE. Congratulations, folks!

* * *

■ *Why not an AMERICAN SHADE TREE WEEK sponsored by the NATIONAL, the WESTERN and the SOUTHERN SHADE TREE CONFERENCES and the AMERICAN INSTITUTE OF PARK EXECUTIVES? Public interest is mounting rapidly in beautification and tree preservation. We are the cogs, to either go forward or back. Let's have some comment!*

* * *

■ On a dash to San Diego recently saw some fine METROSIDEROS ROBUSTA (New Zealand Christmas tree) we had recommended about three years ago for a very windy coastal exposure. Growing beautifully, with no signs of windburn. A superb tree.

* * *

■ *A WALTER WINCHEL BLAT on Mar. 14th derisively states: "If you don't think being a columnist is unexciting and that a columnist meets many uninteresting people, this is what one columnist got in his morning's mail: 'The National Plant, Flower and Fruit Guild request the pleasure of your company at a musical tea honoring Grace Bush in a lecture recital, The Romance of the Trees, assisted by John Knox, tenor.' La Bush, at any rate, has an appropriate name for it." For your information, MR. WINCHEL, these people whom you have belittled are merely doing their bit to make the AMERICA you so vociferously profess to love a MORE BEAUTIFUL AND FINER PLACE IN WHICH TO LIVE. You might take a lesson from them and turn out something constructive instead of breeding hate in the AMERICA YOU LOVE against a people across the sea.*

* * *

■ *Fred Roewekamp, LOS ANGELES PARK DEPARTMENT, sent in this: "In the course of events our inspector ran across some Japanese doing some tree work, and found a sign in the street which read as follows:*

NO PARK
PLEEZE
TREEMING TREES

* * *

■ WILLIAM E. ROSE, VILLAGE FORESTER OF HINSDALE, ILL., informs of the winter activities in his neck of the woods. Seems like the MIDWEST SOCIETY OF PARK EXECUTIVES (a branch of the A. I. P. E.) decided to devote their meetings this year to discussion of arboricultural practice. A splendid series of speakers was obtained.

We'd like to publish some of those lectures, W. E., if you please.

* * *

■ DANA BOWERS, State Landscape Engineer, dropped in and told about a *Jacaranda* tree growing in San Bernardino. What next? Just about the time one thinks he knows a tree's range someone upsets the applecart. San Berdoo gets some heavy frosts (pardon) and a Jac is sub-tropical. This tree is 45 years old—Oh well.

* * *

■ The results of the Toledo, Ohio, Shade Tree Census give some interesting facts and figures. Sent in by Toledo's *best* citizen, *my mother*. 99,203 trees, 122 varieties, including 12 species of fruit; 49,604 of all maples; 24,802 elms; 11,419 Norway maple; 1 Judas tree. Sorry it came too late. Will give the details in the next issue.

* * *

■ *A peach of a story from WM. GUNESCH, Colorado State College, came too late for this issue. July for sure. It's about Rocky Mountain shade trees.*

* * *

Edward H. Scanlon

THE COVER PICTURE: Thanks for this beautiful picture go to Donald Wyman, horticulturist of the Arnold Arboretum. It is the oldest specimen of Prunus Sargenti (formerly P. serrulata sachalenensis) in the United States; was planted from the first seed introduced in 1890. The Sargent cherry is the tallest growing and hardiest of all Japanese cherries. The flowers are light rosy pink and in the fall the foliage has an outstanding red tone. Mr. Wyman recommends this tree for street use and we hope someone with an eye for sensational beauty will submerge the streets of some city with this grand bouquet. The specimen shown is 48 years old, 45 feet tall, 25 foot spread and calipers 18 inches. Truly a real tree for a medium size parkway (5 feet or more) and for interminable beauty.

—Photo courtesy Arnold Arboretum.

April, 1939 A Quarterly Journal Volume 2—No. 2

EDWARD H. SCANLON, Editor and Publisher

"No place is complete without trees. A home without trees is charmless; a road without trees is shadeless; a park without trees is purposeless; *a country without trees is hopeless*"

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CORDIALLY YOURS

CERTIFIED ARBORIST BILL

The majority of opinions solicited pertaining to the Certified Arborist Act in California have been favorable, some highly commendatory—only one opposed.

With no precedent by which to be guided, the committees of the Western Shade Tree Conference, sponsors of the bill, drew from the sample act presented by Mr. Spicer several years ago. Changes were made to fit certain local conditions and, what is most important, regardless of schooling, training or experience, each applicant must take the examination. There is no "grandfather" clause. There are two classifications: Commercial and Non-Commercial. The latter for the benefit of arborists employed by governmental or other agencies, but not actually engaged in competition. The fee for the Commercial man is $25 per year; Non-Commercial, $20, with a classification fee of $5 for the latter should he desire to enter into business.

Naturally some little opposition has sprung up—progress has always had its opponents. There are some who for mercenary reasons would prefer to have the science of tree care remain in the dark ages, but intelligent arborists who realize the need for educating people that tree preservation cannot safely be entrusted to a pack of ordinary laborers are very much in earnest in their efforts to secure passage of this bill. Another very interesting and encouraging sign is the great interest displayed by Park people, who would come under the non-commercial classification. Many of them feel it would be a distinct asset for them to hold such a certificate and unquestionably the day will come that applicants for city positions will be required to be certified arborists.

Dr. Jesse R. Kellems, the genial 60th district Assemblyman who enthusiastically espoused this cause, has worked long and hard for this bill and all California readers should drop a letter to their Assemblyman and Senator asking them to support Assembly Bill No. 238.

INSURANCE RATES AND TREE MAINTENANCE

A startling investigation of almost revolutionary portent has come to our attention in the past week. The National Board of Fire Underwriters have undertaken to determine the cities in which an adequate fund is given to the park departments for proper maintenance of street trees.

The big winds of recent months, both east and west, with resulting loss claims due to falling trees, has led to investigation of this hitherto taken-for-granted condition. However, after a rather intensive survey following the February blow in California, insurance claim experts believe that had many trees

been properly pruned, cabled, braced and planted properly so as to induce deep rooting, much of their trouble would have been avoided. The findings were no reflection on the ability and integrity of the various park departments; rather, the fault must be placed squarely in the lap of the budget pruners.

The proposal is to base insurance rates entirely on the adequacy of the park departments' budget for properly safeguarding the public from poorly maintained trees. This will be a public service policy of insurance underwriters comparable to the existing services on fire, etc.

Park people and arborists have long recognized the need for sufficient funds to add men and buy equipment, but they were as a voice crying in the wilderness—but as soon as pocketbooks begin to suffer by the budget pruners' activities, then that voice in the wilderness will change to one coming through a public address system—then action.

An insurance underwriters' representative has agreed to attend the Sixth Western Shade Tree Conference in Oakland this month to discuss this problem.

JOHN MUIR-KINGS CANYON NATIONAL PARK

At long last the establishment of the John Muir-Kings Canyon National Park seems about to become a reality.

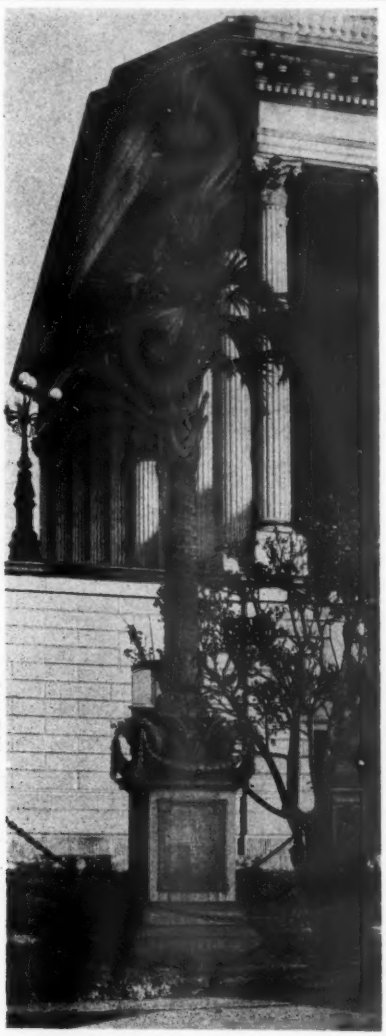
Many, many years has this park been held up for one reason or another, but now with the threat of destruction to the famous Redwood Mountain grove of Sequoias if not acquired by the summer of 1939, the Congress seems to have awakened and acquisition is expected any day.

This magnificent grove of Redwoods whose glories were first sung by John Muir, is privately owned and must be logged, starting this coming summer, to save the owner's investment, because of a default in taxes.

There is contained in this grove over 7,000 sequoias, ranging from two to thirty-two feet in diameter, and is considered one of the largest and most diversified groves in existence.

It is grand country that this proposed park covers and people throughout America should write their Congressman in Washington and urge immediate passage of House Bill 3794.

ODDITREES



The "Iron" (Sabal) Palmetto

A new type of tree preservation has been resorted to in Columbia, South Carolina, where restoration of the famous "Iron" Palmetto is under way.

This monument erected in honor of the Palmetto regiment that served with valor during the war with Mexico and which has the names of the members inscribed on its four sides, was "uprooted" in a severe storm last February, 1939.

The innovation in surgery practice was brought about by a Columbia welding concern which showed local arborists how to really cable and brace and make it stick through the use of acetylene (not a paint).

This "Odditree" was contributed by C. S. Schaeffer, Asst. State Forester of South Carolina.

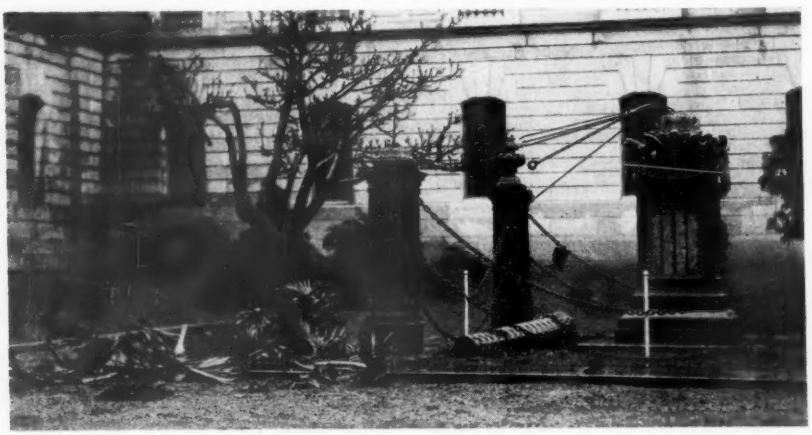
■ The ZEPHYR that wafted down from the GLORIOUS California hills early in February was in some respects a blessing in wolf's clothing. The tree to suffer most severely was the black Acacia (A. melanoxylon), the absolute low in the street tree list. This storm proved just about what the New England hurricane did—that—the trees that all competent Arborists and Park men recommend are still tops. PHILIP ALDEN in the SHADE TREE lists the following ten trees in the order of their relative wind resistance: Q. PAULSTRIS and RUBRA, GINKGO BILOBA, U. AMERICANA, TILIA CORDATA, P. ORIENTALIS, A. PLATANOIDES and RUBRUM, GLEDITSIA TRIACANTHOS and A. SACCHARUM.

TED HOLDERNESS in Pasadena had 250 extra men cleaning up 10,000 windthrown trees. The live oak (Q. AGRIFOLIA) CAMPHOR, JACARANDA, PEPPER, CREPE MYRTLE were among those least affected.

* * *

The Boy Scout troop sponsored by the Santa Monica Police Department recently indulged in an interesting little reforestation drive in the fire denuded Santa Monica Mountains.

Led by Scoutmaster Frank C. Otto and Committeeman B. H. McClure, the Golden Bear troop spent Saturday, February 18th, planting 1500 acorns of California live oak in canyons and other sheltered places.



Lightning Protection for Trees

By A. Robert Thompson
Forester, National Park Service
Washington, D. C.

What is lightning? As commonly used, this term is applied to certain types of heavy electrical discharges in the atmosphere which may take place from one cloud to another, from cloud to earth, or from earth to cloud. The method by which sufficient potentials are built up to result in lightning is an interesting phase of electrical phenomena.

We know that electricity of opposite polarity (positive and negative) is mutually attractive, and we know further that to cause a lightning discharge between a cloud and the earth each must be charged with electricity of opposite polarity. Experiments made have shown that thunderclouds are bipolar in nature, the upper part of the cloud usually being positive and the lower part negative. The earth normally carries a negative charge, but the overhead passage of the cloud usually induces a positive charge beneath it.

The formation of these charges is speculative to some extent, but various observations and experiments indicate that the origin of the electrical separation of thunderstorms is largely due to the action of vertical currents on precipitation. The magnitude of the electric charges produced by the breaking of a drop of water has been shown to be sufficient to account for the electrical effects observed in the most violent thunderstorms.

The atmosphere surrounding the earth normally acts as a retardant to the passage of the electricity, but when a sufficient potential gradient is built up the atmosphere breaks down and allows a discharge between clouds, or between clouds and earth, and we have a phenomenon generally recognized as lightning. The path of the lightning stroke is presumably determined by the intensity of the electrical stress in the air; hence, a high structure or tree will often receive the stroke, since the electrical stress is higher at its surface than in other parts of the air at the same height above the ground.

Types of Lightning Damage to Trees

Lightning damage to trees falls into three general categories. The first and most apparent is the physical shattering of an entire tree, or some part of it. The second is more difficult to ascertain, since

—*Photos courtesy National Park Service*

Radial conductor running from down conductor to ground rod

it concerns internal or hidden injuries that may not be apparent immediately or without thorough examination. The third type of damage may affect a tree by killing all or part of the root system with no visible symptoms above the ground except the sudden death of the tree.

Under the first heading, lightning may affect a tree in one or more of the following ways:

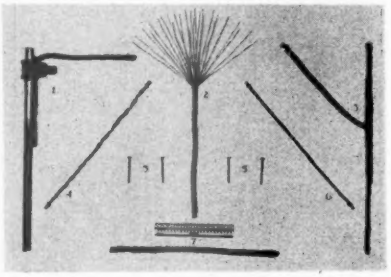
1. Completely shatter the woody structure.
2. Strip all bark or strips of bark.
3. Shave off the loose outer flakes of the bark.
4. Shatter the base and fell the otherwise uninjured tree.
5. Shatter and set fire to the woody structure.
6. Strip bark in disconnected strips along the limbs or trunk.
7. Girdle and kill by tearing out spiral bark strips.

The second general phase of lightning damage, as mentioned previously, consists of unseen or less visible injury to the internal structure of the tree as in the cambium and sapwood. Such injury sometimes causes the leaves on one side of the tree, a single limb, or the terminal growth to brown and die with no other external symptoms. Dodge has attributed many of such injuries to earth to cloud discharges and possibly to "resurges" resulting from a direct stroke elsewhere. Occasionally a tree will show no visible symptoms of being struck and some years later may develop a very small ridge on the bark which follows the grain of the wood. Careful examination of the cross-section of the cambium across such a ridge might reveal a small pinhole extending under the ridge. We have all noted spiral ridges on trees which are diagnosed as lightning damage because they differ materially from frost cracks and have no other probable cause.

The third type, or damage to root systems, is not so common. When this type of injury occurs alone, it is extremely hard to diagnose accurately, since the evidence is hidden in the ground. The discharge may be so severe that the tree or some portion of it dies because the food and water supply was cut off when all or part of the root system was killed. The extent of this damage often may be ascertained by a careful examination of the fibrous roots. If a large portion of these has been injured and discolored, the tree will probably die.

Factors Influencing Effect of Lightning

The varying effects of lightning upon trees are thought to be explainable partially by the variations in voltage of the discharges. A bolt of low voltage is apt to show little or no visible evidence of its passage, while a discharge of high voltage may cause extensive and often irreparable damage. This destruction may



(1) *Ground rod;* (2) *frayed end for air terminal;* (3) *proper splice;* (4) *braided miniature cable;* (5) *copper nails;* (6) *twisted miniature cable;* (7) *braided main cable*

(*Continued on page* 13)

Growth Features of Q. Agrifolia

By D. T. MacDougal
Carnegie Institution of Washington

Editor's Note:
This article is the first of a series of three on the California Live Oak. The next will give the cultural practices and its street uses by C. F. Holderness, City Forester of Pasadena. In the third of the series, Ralph D. Cornell will describe its landscape uses.

The California live-oak (*Quercus agrifolia*) is native to a region extending from Mendocino County southward in the Coast ranges to the central mountains of Baja California. It adapts itself to a wide diversity of soils, drainage, rainfall and other climatic features with corresponding variations in trunks, leaves and habits of growth.

First recognized as a species in 1801 from specimens collected near Monterey, it has been included in studies of tree growth begun at Carmel in 1918 within five miles of the type locality.

While known as the "California live-oak" by reason of the fact that the leaves are held through the winter until a new suite are developed in the spring, it is to be noted that ten other California oaks carry their leaves for a full year, and one of this number—the island oak (*Q. tomentella*) carries its leaves for two full years. Seven other of our oaks are deciduous, casting off their lobed leaves at the end of the season, and display bare branches during the winter.

The general awakening of buds of the California live-oak takes place late in February and in March, but a few opening buds may be seen as early as December. As part of a series of experiments upon the growth promoting substances in trees defoliations were carried out at various times from November until August for the special purpose of determining what effect the activity of leaves during the dormant season on growth in the following summer might be. As these operations were in duplication of the destruction of leaves by various insects and other animals the results have some interest for the horticulturist.

The leaves were pulled directly from their attachments to twigs in most cases but in a few a more tedious practice was followed by which the petioles were snipped near the base.

The reaction to repeated defoliations may be illustrated by the notes on a small tree from which all leaves, 700 in number, were removed on Jan. 6, 1938. 4,650 newly formed leaves were taken off on May 1st, the average spread of single leaves being less than half of the old leaves of January. At the final operation on July 24 less than 4,000 leaves were present, the average spread of the single leaves being less than that of May.

Fig. 2—Dendrograph in position for measuring changes in diameter of a small trunk. Increase and daily contraction are recorded on slip of paper carried by revolving drum on left. Parts of records for several weeks are seen.

The awakening of buds after August 1st resulted in the development of leaves in a number less than in May and July and probably no more than were present in January, but which would be adequate to carry the tree through the winter. The implied capacity for replacement of leaves would be greater than necessary to endure any ravages encountered in the Monterey region. The number of dead twigs present in January, 1939, was apparently greater than the average but the appearance of the living branches was normal. Many leaves had been affected by mildew but as this disease was widely prevalent during the year, no special relation to defoliation could be assumed.

Some modification of the wood laid down in the defoliated tree would naturally be expected and the effects were very marked. The greater part of the material which enters into the construction of cell-walls originates in the leaves and the operation would obviously lessen production in the leaf-factories. Briefly stated, the usual number of new cells had been formed and these had enlarged to the average size, but their walls had not undergone the secondary thickening which makes for rigidity. Thin-walled cells of the rays and wood-parenchyma appeared to be slightly larger than the normal.

Modified structure in defoliated trees can not be ascribed entirely to a deficiency of building material. Evidence is accumulating that in addition, certain growth promoting substances, reminiscent of the "vitamines," are necessary. Earlier investigations led to the conclusion that these "auxins," as they are termed, originate in buds and leaves and are translocated downward in twigs and branches. So much seems acceptable but that the growth promoting substances pass down long trunks and out to the tips of roots has not been proved.

It is important to keep in mind that growth of a tree is of two kinds: one which consists in elongation of roots and twigs, and the other in the addition of layers of wood and bast to the diameter. The difference is not simply a matter of position. The extension of a root or a shoot is due to the division and enlargement of compressed globular cells arranged in a dome-shape mass sheathed by the bud scales at the ends of twigs or

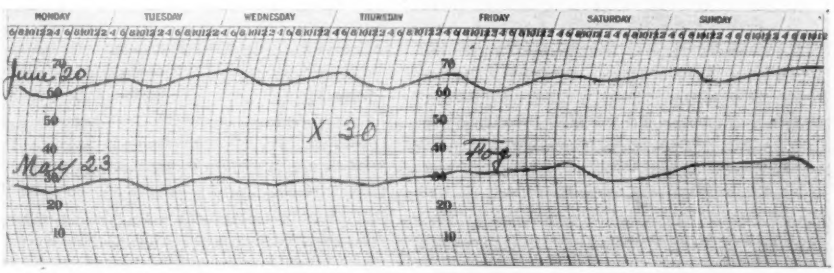


Fig. 3—Copy of record of growth of trunk of California live-oak during two weeks in 1932. Increases are denoted by the upward course of lines traced by the pen of the dendrograph. The daily sag or drop indicates shrinkage in wood and bark due to loss of water. This contraction was least on Friday, May 27, in a fog. The diameter of the trunk increased 0.3 mm. (0.075 inch) during the week beginning May 23, and 0.2 mm. (0.06 inch) in the week beginning June 20th.

(*Continued on page* 15)

Sixth Western Shade Tree Conference In Oakland April 26th-29th

A rising tide of interest in the splendid accomplishments of this important annual meeting of people engaged in tree activities promises a record attendance in Oakland for the sixth meeting, April 26th to 29th.

A special privilege has been extended to the delegates by the officials of the California Spring Garden Show to attend a preview of this famous affair on the night of April 26th.

A special day on Treasure Island, the Golden Gate International Exposition has been christened "Western Shade Tree Conference Day." This should prove a gala finish for what promises to be a grand meeting.

Recently at Santa Barbara the California Association of Park Administrators voted to hold their next meeting in Oakland at the Shade Tree Conference. This will be the first meeting of this organization in Northern California. For this occasion a special Park Section Roundtable has been included on the program and it is hoped it will become a regular feature, inasmuch as the majority of the park administrators are faithful members of the conference. Sessions will be held in the Hotel Leamington.

The tentative program follows:

April 26, afternoon:

3:00. Registration, Hotel Leamington.

Evening:

Attend Preview of California Spring Garden Show.

April 27, morning:

10:00. Welcome by Mayor McCracken.

10:30. "Deciduous Street Trees for Central California," by L. Glenn Hall, A.S.L.A., San Francisco.

11:00. "Functional Street Planting," by William Penn Mott, Jr., Landscape Architect, Oakland, Calif.

12:00. Special luncheon date.

Afternoon:

2:00. "Flowering Trees for California Streets," by Fred Roewekamp, Landscape Engineer, Los Angeles Park Dept.

2:30. "Safety Practices in Western Arboriculture," by Roger Sohner, Arborist, San Anselmo, Calif.

3:00. Park Section Roundtable.

Evening:

7:00. Discussion of Certified Arborist legislation.

April 28, morning:

10:00. "The Powdery Mildew Disease of Oaks," by Pierre Miller, Dept. of Pathology, University of California at Los Angeles.

10:20. "Insect Enemies of Some Deciduous Shade Trees," by Dr. H. E. Burke, Fax Laboratory, Los Angeles, Calif.

10:45. "The Ilicis Mite: Injurious to Trees and Shrubs in California," by Ralph H. Smith, Professor of Entomology, University of California at Los Angeles.

11:00. "Selection of Trees by Breeding," by H. E. Stockwell, Dept. of Forest Genetics, Placerville, Calif.

11:15. Arborists Roundtable for discussion with scientific members.

12:00. Luncheon with Business Men's Garden Club, Lake Merritt Hotel.

Afternoon:

2:00. Tour of Oakland Parks and visit Regional Parks.

Evening:

7:00. Annual Banquet. John McLaren and Julius Girod, "Horticulture of the Golden Gate International Exposition." Followed by dancing and entertainment.

April 29:

"Western Shade Tree Conference Day" on Treasure Island.

Two Notable Islay or Holly-Leaved Cherry Trees. The Islay or Holly-leaved cherry is an interesting native species usually favored for use as an ornamental hedge or small specimen plant. Most people probably think of it as a shrub, but *Prunus ilicifolia,* as it is known to botanists, occasionally does reach tree size. My attention was recently called to two specimens of this species in Los Altos, Santa Clara County, which may prove to be the largest in existence. The first is on the Schuur property on San Antonio road between Mt. Hamilton and Edith avenues. It is a double tree, forked at one foot from the ground, the two trunks being 19 inches and 13.8 inches at four and one-half feet from the ground. It is 30 feet in height and the crown of glossy leaves forms a rounded dome 32 feet across. About a quarter mile to the north on the Hugh Wiley place, is a much larger specimen called "cherry oak" by gardeners on the adjacent Collier property. It is so large that it compares very favorably with surrounding specimens of coast live oaks. This tree forks near the ground into three trunks which measure 20.1, 19.4 and 17.5 inches in diameter breast high. It is 42 feet in height and the rounded crown measures 70 feet in diameter east and west and 45 feet in diameter north and south. In the latter direction its growth has been somewhat impeded by an adjacent live oak to the south.—Woodbridge Metcalf,

Weakley Heads Third Southern Conference

The Second Southern Shade Tree Conference was a very successful one, with delegates attending not only from the south but from the north as well. Those members of the National Shade Tree Conference that attended from the north were Norman Armstrong, president of Norman Armstrong, Inc., White Plains, N. Y; H. J. Howe, City Forester, Baltimore, Md; A. Robt. Thompson, U. S. Dept. of Interior, National Park Service, Washington, D. C; W. O. Hollister, Sec.-Treas. of National Arborists Association, Kent, Ohio; R. M. Weakley, Director of the Howard Tree Research Laboratories, Warren, Penn. Illness prevented the National Shade Tree Conference president, Karl Dressel, from attending.

Many fine papers were presented. One idea advanced was that the conference petition the National Shade Tree Conference requesting that they be taken in as an affiliate of that organization and enjoy the advantages of the larger or parent organization as a regional or southern meeting of the National Shade Tree Conference.

Officers elected for the Third Conference were: President, R. M. Weakley, Director of the Howard Tree Research Laboratories of Warren, Penn. and Palm Beach, Fla; Vice-President, Mrs. Porter Baldwin, President of the Florida Federation of Garden Clubs; Secretary-Treasurer, Prof. H. S. Newins, Director of the School of Forestry, University of Florida, Gainesville.

The next conference will be held February 22-23, 1940, at the University of Florida, Gainesville. Birmingham, Ala., was favorably mentioned as a possible choice for the 1941 conference.

DEAR SIR:

I RECENTLY SUBSCRIBED TO YOUR MAGAZINE "TREES". I THINK IT'S THE LAST WORD FOR THE ARBORIST. HERE'S HOPING IT GETS TO BE A MONTHLY PUBLICATION. WILL YOU PLEASE WRITE ME BY RETURN MAIL TELLING ME WHERE I MAY OBTAIN MY SUBSCRIPTION FOR THE "ARBORISTS NEWS"?

THANKING YOU IN ADVANCE FOR A PROMPT REPLY.

Yours truly,
Herbert W. Anderson,
Arborist,
Neenah, Wis.

New Disease of London Plane

A comparatively new disease of the London Plane (*Platanus acerifolia* Willd.) threatens to destroy this extensively used street tree. The disease has been found in Maryland, Pennsylvania, Virginia, Washington, D. C., and southern New Jersey. Mr. Hollis J. Howe, City Forester of Baltimore, Maryland, states that at least 700 trees in his city have already been killed by the disease. A survey in 1936 showed that 800 trees were infected of the 2,500 trees examined. He estimates that 7,500 to 10,000 trees have either died or are infected in the Middle Atlantic States to date.

The mortality from the disease is unusually high since trees apparently never recover once they become infected.

Symptoms

One of the earliest symptoms is a very thin crown, due to a conspicuous reduction in both the amount of foliage and the size of the leaves. The entire tree dies within a year or two following this period of weak vegetative growth.

Another symptom is the appearance of long, narrow, longitudinal lesions on the trunk, usually below the lowest branches. The tissue in such lesions is soft, wet and spongy. A cross-section of the trunk shows numerous black radial streaks throughout the wood, especially noticeable in the vicinity of the bark lesions. Irregular, vertical black streaks in the wood are visible when the soft, cortical tissue is cut away.

The peculiar manner in which the disease spreads is also rather characteristic. It usually starts in a single tree and then very rapidly spreads successively along the full length of a row of London Planes.

Manner of Spread Unknown

Up to the present time, no vector has been definitely associated with the spread. The manner in which the disease moves along a row of trees planted on one side of the street suggests that the infection may spread by root grafting of an infected tree with an adjacent healthy tree.

Control

Definite recommendations cannot be given because of the comparatively small amount of research done. Removing and burning affected trees is the safest and best course to follow for the present. The eradication work conducted during the past year in Lower Merion Township (Pennsylvania), clearly demonstrates the value of such a procedure. A loss of only 60 trees was reported from this area during 1938, as compared with significantly larger numbers lost in years previous to the initiation of the eradication campaign.

Obviously many important phases of this problem still need investigation. Further studies may reveal more adequate methods of checking this relatively new and very destructive disease of the London Plane.

Anthracnose of Sycamore

By FRANK B. HERBERT
Entomologist, Shell Oil Co.

When the buds unfold into large green leaves to put shadows on the mottled bark of the sycamores, nature is being rightfully fulfilled. Yet too often this has to be redone once or twice each spring for the sycamore blight has turned them brown and made them fall. They look as though a severe frost has struck them.

First, the new tip leaves acquire one or two brown spots which soon envelope the whole. Cankers develop on the twigs, causing them to wither before more leaves can take their places.

This drains their vitality, making them unsightly and misshapen, sometimes killing large limbs or whole trees.

All species of sycamores or plane trees are susceptible, the American plane (*occidentalis*) more so than the London or European (*orientalis*), and the native western sycamore (*racemosa*) still more so.

This blight or anthracnose [*Gnomonia veneta* (S. & S.)] reaches clear across the United States as well as Europe, and also attacks oaks, including the California live oak and the white and red groups, but not as severely as the sycamore.

The disease overwinters on the leaves that have fallen to the ground or in the twig cankers on the tree. With humid conditions in the spring, the spores develop to attack new foliage. We cannot do much to control these conditions, but we can prevent much of the trouble by sanitation and spraying with a fungicide.

By sanitation is meant raking up the fallen leaves and trimming out the dead portions in the tree before growth starts in the spring.

The spray should consist of Bordeaux mixture or some other form of copper equal to 6-6-50 (6 pounds of bluestone and 6 of lime to 50 gallons of water). Basic copper sulphate, containing double the amount of copper, would be better than the regular Bordeaux, as it makes a less noticeable deposit on the tree. It does not require the addition of lime as it is already neutralized and should be used at 6 pounds per hundred gallons of water.

This should be applied just when the buds start to break and repeated in ten days to two weeks. The second dosage may be reduced some if desired.

Dormant or summer oil emulsion should be added to the Bordeaux mixture at the rate of 1 gallon per hundred of water to improve the spreading and sticking qualities.

If the sycamore scale is present, a higher dosage, 3 gallons of summer oil emulsion per hundred, should be used in one of the sprays. Three or four pounds of lead arsenate may be added to the second spray for the control of the leaf blotch miner, the larva of a moth, which often ruins quite a bit of the foliage.

Other pests, such as the lacebugs or red spiders, generally are not present this early in the season, so later oil sprays will be necessary for their control.

The sycamores become large trees, so large spray equipment or ladders are necessary to reach the tops. There is no substitute for thorough spraying.

One is well repaid with green foliage and beautiful trees if these recommendations are followed.

I AM MUCH PLEASED WITH THE CHARACTER OF THIS PUBLICATION WHICH I THINK SHOULD SERVE AN EXCEEDINGLY USEFUL PURPOSE. AS STATED IN A FORMER LETTER, I WILL BE GLAD TO SEND ITEMS OF INTEREST FROM TIME TO TIME, FOR INCLUSION IN YOUR MAGAZINE. WITH EVERY WISH FOR ITS SUCCESS, I AM

Yours very truly,
M. B. Pratt,
State Forester of California.

* * *

ENCLOSED PLEASE FIND ONE DOLLAR ($1.00) FOR 1 YEAR'S SUBSCRIPTION TO YOUR "SWELL" NEW MAGAZINE, TREES.

Yours very truly,
VILLAGE OF HINSDALE, ILL.
W. E. ROSE,
Village Forester.

LETTERS

This letter concerns your January article, "Toxic Reaction of Juglans."

Foresters on several occasions have accounted for lack of vigor of some plantations of locust and other species to the proximity of walnut trees, the leaf litter of which is supposed to unduly raise the acidity of the soil. I feel, however, that for ornamental uses of walnut, the trees might get blamed undeservedly for failures of plants under them. In my own city garden, now about 15 years old, there are 13 California Black walnuts about 35 years old, making a high overstory. The leaf litter is heavy. The garden in the walnut area is of an informal style and gets no cultivation, except pruning and removing excess growth to retain a certain natural character. Under the trees a large variety of plants thrive and in fact are established so well as to reproduce from seed naturally. There is an all-year ground cover of Kenilworth ivy and violets, and some honeysuckle, which latter, with volunteer blackberries, we try to control. There are violets, forget-me-nots and bleeding heart in profusion; some primulas, a number of bulbs like tulip, narcissus, ranunculus, anenome, Japanese iris, columbine and sword and bracken. The braken spreads so rapidly it must be constantly pulled. Then there are specimen plants of Matilija poppy, lilac, trillium, rhododendron, azalea, a rose bed, etc.

There are a number of shrubs—several species of cotoneaster, pyracanthus, pittosporum, citisus—and several flowering almonds, cherries and peaches, thujas and a Montezuma cypress.

All but lilac seem to be in perfect health, in fact, nearly all of them reproduce naturally, even English holly. Of course, many of these like a sour soil, but not all. So, while some species of plants may not do well under walnut, there are plenty that will.

—Emanuel Fritz, Univ. of Calif.

* * *

Dear Mr. Scanlon:

I was very glad to see the letter and statement by Dr. D. S. Welch in the January number of Trees Magazine on the "Treatment of Tree Cavities," since it touches a subject on which misconception appears to be especially prevalent among those dealing with the care of trees. I refer to the matter of decay of the wood and of possibilities for its arrestment.

A current example is provided by the otherwise excellent article on pages 10 and 11 of the January issue, in which the use of rubber as a cavity material is described. All is well until the second column, when the unnamed writer gets in over his depth by the statement that cleaning out dead and diseased tissue "rarely, if ever, eliminates living spores in the live wood." He continues: "Driving the wax in under steam pressure assures a complete fill and a *deep penetration into the cells in the live wood* so that *spores are killed and reinfection is made impossible.*" (Italics are mine.)

It appears as if a good many of our tree men could benefit by some fundamental instruction in the biology of heartwood-destroying organisms and in the limitations of disinfectant measures. Trees Magazine should be able to help in bringing about this better understanding. Sincerely,

WILLIS W. WAGENER,
Senior Pathologist,
U. S. Dept. of Agric.,
San Francisco, Calif.

TREE PRESERVATI

Cavity Materials—N

A special magnesite compound for the filling of tree cavities, known in the trade as Flexifill, is a development which has behind it years of successful and highly satisfactory use on a large variety of trees and under widely varying conditions. There is a large series of magnesite compounds. One of these, Flexifill, has been developed in such a manner as to meet the exacting requirements of an acceptable filling material for tree cavities.

A good filling material promotes rapid growth of callus tissue and a consequent better sealing of the edges. Various methods and many materials have been used. Efficacy depends in large measure upon the skill in mixing and applying and, to some extent, upon the preference of the operator, since one succeeds with that in which he has confidence.

The first step in cavity work is to decide whether the condition of the tree justifies filling. There has been in earlier years a tendency on the part of some operators to fill trees even where decay had advanced to such a degree or the tree was so devitalized as to make failure probable. It is hazardous to excavate to such an extent as to leave a shell of wood only a few inches thick. The sapwood and, to a certain extent, the heartwood have a definite relation to the essential cambium and if the tissues beneath are damaged or dehydrated sufficiently, the overlying living tissue, the cambium, is likely to die, and in the case of a good sized cavity this may result in the death of the tree.

A small cavity heals over quickly. It is much less costly than a large one. Ordinarily, it is not necessary and frequently it is inadvisable to remove more than the evidently weakened or partly rotted wood within the cavity. Experience is the best guide in excavation. Hand or power tools may be used. Experiments and practical experience indicate that if the filling materials seals the cavity in an air tight or practically air tight condition, there will be little or no subsequent development of wood rots.

Having decided that filling is justified, the next step is to carefully excavate the badly affected wood, cutting back to the healthy cambium along the entire margin and shaping the cavity so that there will be a gradual taper of the cut edges both at the top and the bottom in order to

Well-shaped, partly filled cavity showing "heal collar" forming a spout at base and wood screw brace-rods

make possible a free sap flow along the whole length of the heal. The rapid growth of callus tissue made possible by streamlined cuts is a sign of good work.

An essential precaution is to conserve the cambium adjacent to the cut surface and for this purpose nothing is better than a protective covering which prevents drying of delicate cell tissue and stimulates callus growth. This should be placed in such a way as to cover the recently cut outer edges of the wound and shaped at the base into a spout to carry away from the bark surface wash or drip from the cavity. It is unnecessary to apply a specific disinfective. Flexifill has marked fungicidal properties.

A small cavity needs no bracing. A long cavity of some size or a large cavity may require bracing, preferably with wood screws both above and below the cavity and also in the cavity in order to hold the walls of the excavation rigid and

VATION PRACTICES

als—No. 2 Magnesite

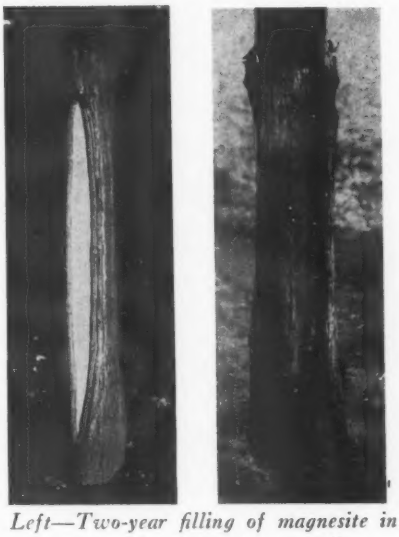
prevent their pulling away from the filling material. A forked or V-shaped tree should be made rigid with parallel screw rods above the cavity so that the filled area must move as a unit. It is obvious that bracing or strengthening where advisable should be done before filling.

It is essential that the filling material adheres firmly to the wood. Quick setting and an elasticity in the hardened filler approximating that of wood are both desirable. The filling material in itself should not be absolutely air tight, otherwise moisture may collect back of the fill and pressure develop which might start leakage from behind and result in the development of that curse of cavity work known as "slime flux." This is impossible with Flexifill.

A filling material which can be readily and quickly applied has practical advantages in the reduction of labor costs. These last may prohibit or almost prohibit the use of anything which cannot be applied in a plastic form. It is not suggested that quality be sacrificed to permit speedy filling. That is unnecessary.

The material found most satisfactory in the work of one large company is the magnesite compound known as Flexifill.

Treatment of basal cavities—use of brace-rod for rigidity



Left—Two-year filling of magnesite in sugar maple. Note vigorous callus. Right—Same view nine years later. Filling entirely covered.

It possesses to a remarkable degree the requirements of an ideal filler. It adheres closely to the wood and possesses nearly the same characteristics, including weight and elasticity. It is not crushed by the pressure of the developing callus and when used in connection with the heal collar, there is a rapid production of callus or scar tissue and within a few years moderate sized fillings are entirely overgrown by newly formed bark and wood. Thereafter, it becomes to all intents and purposes a part of the tree itself. The only disadvantage is that it requires great skill and must be prepared with close attention to exacting specifications.

The application of this material commends itself to the practical tree man. It is readily mixed to a consistency approximating that of putty and is quickly and easily inserted in the previously prepared cavity. No special tools are necessary. It is handled much like a stiff cement. The surface smooths readily with a trowel, and within a few hours it hardens to a wood-like surface with a color not widely different from that of the bark of most trees. It can be stained or painted readily to harmonize closely with the bark of any tree. This magnesite compound has been used in monolithic work of large size and in all such places has demonstrated a marked superiority to some of the more rigid fillings used in earlier days.

Question of Chlorosis

Among the questions placed in the question box at the time of the Northwestern Ohio Short Course and the time did not allow the answering, was the causes and cure of chlorosis. In the portions of the state with alkaline soil, chlorosis has occurred rather extensively on such plants as pin oak and to a lesser extent sweet gum. The accepted reason for the cause of chlorosis or yellowing of foliage is the lack of available iron to the chlorotic parts of the plant. Various means of control of chlorosis have been attempted. These consist of spraying of the foliage with an iron salt solution, injecting iron salts into the trunk of the tree either in a salt or liquid form, and an application of iron sulfate to the soil.

From the results of our tests here at the University, we are in favor of soil applications. Iron sulfate can be applied along with the fertilizer used in feeding shade trees. Since iron sulfate is available only in acid soils, it is advisable to add some sulfur along with the iron sulfate. The rate of application that has been followed in the last few years is half a pound of iron sulfate plus a half pound of sulfur to each inch in diameter of the trunk of the tree. This amount, placed in holes over the entire area occupied by the roots of the tree, will usually overcome chlorosis.

There are a number of underlying factors, however, which may influence reaction. The plant itself should be in a relatively vigorous state which means that if it is not growing vigorously it should be fertilized. Also it is advisable to treat the tree at the first sign of chlorosis. If the treatments are made at this stage of the trouble, chlorosis can usually be overcome. If injection is followed, the material should be inserted into the tree trunk at uniform intervals around the trunk. This will give a fairly even distribution to all of the branches.—*Nursery Notes, Ohio State University.*

Elm Blight, or Phloem Necrosis

Elm Blight or *Phloem Necrosis* is a virus disease affecting American elms in the Ohio River watershed area. Thousands of elms have been killed in central and southern Ohio by this disease.

First visible symptom is a troughing and drooping, but not a distinct wilting, of the leaves at the extreme top or at the tips of outer branches. This troughing and drooping gradually spreads over the entire crown and there is a thinning out of the foliage. The rolling or troughing of the leaves exposes their under surfaces to view, which gives the tree a characteristic grayish-green cast. Yellowing of the leaves and defoliation soon follows. In advanced stages of the disease the roots die, the feeder roots first, followed by the larger roots. A golden yellow discoloration appears in the cambium and phloem of the larger roots ahead of the decay and this discoloration frequently extends to the lower trunk and branches. Phloem tissue first is yellow, then brown, with small scattered black flecks and finally dark brown and necrotic.

The disease is not caused by a fungus or bacterium but is due to a virus which has been transmitted experimentally by grafting roots or branches from diseased trees on healthy trees. It is not known how the disease is transmitted in nature.

No control for the disease is known.—Paul E. Tilford, *Diseases of Shade Trees.*

New England's Shade Tree Insect Problems

By E. P. FELT *and* S. W. BROMLEY
Bartlett Tree Research Laboratories
Stamford, Conn.

—*Photos courtesy F. A. Bartlett Tree Expert Co.*
A Connecticut Grove of White Pine after the Hurricane

The New England hurricane of September 21st last has ushered in a host of problems for the tree worker, not the least of which is the insect problem, an aftermath of the storm, which has not yet begun to make its presence felt.

It is difficult for those who did not see the conditions during the first few weeks after the Big Blow to realize the havoc that was wrought to New England's trees by the violence of the wind. The morning sun of September 22nd looked down upon a tangle of twisted and broken trees as far as one could see in every direction, while near the coast in the path of the east semicircle of the hurricane, the salt spray had turned the green of the fields, trees and woods into the seared brown of winter.

Efforts during the fall and winter have cleared up a considerable portion of the street debris in most places, but there is still an unprecedented amount of broken branches and racked and weakened trees which will furnish excellent breeding - places for such insects as the bark beetles, wood borers, timber beetles, sawyers and other wood and bark-infesting insects.

Prionus laticolis

The oaks, particularly the oldest trees, which as a group with the sycamores probably withstood the force of the wind better than others, are in many instances weakened by stripping, breakage of the branches or twisting of the trunks and are in a condition favorable to attack by the two-lined chestnut borer, which every year causes the death of a large number of oaks in the northeastern states in places where the trees had been previously injured by some other factor.

There is also a great amount of concealed injury to the hickory trees which will predispose many to the attacks of the hickory bark beetle, an insect which has already acquired the reputation of being the most serious insect enemy of weakened hickory trees.

The birch trees are constantly in danger of attack from the bronze birch borer, and although birch trees stood up well during the storm in comparison to many other kinds, the buffeting and twisting that they received will undoubtedly render them more susceptible to attack by this borer.

The threat to the elms is particularly serious. The American elm is our most highly cherished street tree and the ominous shadow of the Dutch Elm disease in recent years has caused serious apprehension.

The program of tree sanitation prosecuted by the Federal Department and by the States in the Dutch Elm Disease area had, until the hurricane, rendered the majority of elms in many areas, by removal of dead branches and infested trees, less acceptable for the breeding of the European Elm Bark beetle, the principal carrier in this country of the Dutch Elm Disease. The great storm of September 21st has changed the picture to a considerable extent. Much of the good work has been nullified. It is to be expected that the European Elm Bark beetle will increase again with the great abundance of weakened wood and dying and hanging branches which produce conditions most favorable for bark borer development. This will, of course, complicate conditions in controlling or restricting the spread of the Dutch Elm Disease.

The storm has also produced conditions which, within the next few years, will presumably favor that arch-enemy of New England trees, the notorious and costly Gypsy Moth. The white pine groves in the range of this insect were the best natural buffers of the moth. The Gypsy Caterpillar fed on pine only as a last resort and the checkerboard of the pine groves on the landscape tended to split up infestations. Unfortunately, pine groves were among the principal sufferers from the hurricane and in place of the former pines, judging from observations in the past, in many areas oak and birch will spring up in their place, furnishing ideal breeding grounds for the Gypsy Moth.

Many of the standing pines in New England are in a weakened condition and it will not be surprising to learn of outbreaks of the pine bark and timber beetles here and there during the next few years. In the south Atlantic States, hurricanes have been observed to weaken some of the species of southern pines to the extent that bark beetles, during the ten years immediately following the storm, killed more trees than were originally blown down or broken off by the wind.

Furthermore, the reduction in street and shade trees in many urban areas will mean more leaf-feeding insects, particularly in the case of the Elm Leaf Beetle and Japanese Beetle, to concentrate on the remaining trees.

The best of tree care during the coming year is demanded by these conditions in the hurricane area to protect the shade trees that are left. A sound program of tree sanitation will call for the removal of focal centers of borer attack, spraying to protect new foliage and feeding with a balanced tree food, not only to increase the vigor and vitality of injured trees, but also to promote deep root growth. This latter means better anchorage and is of utmost importance.

Lightning Protection for Trees

(*Continued from page* 6)

be laid to the resistance of the woody structure to the passage of the electricity. The resistance raises the sap to such a high temperature that steam is produced, which exerts a high pressure on the cellular structure and rips and tears the wood and bark.

Another factor which may vary the effect of lightning is the moisture content of the tree and its surfaces. It is believed that the cambium and sapwood normally offer less resistance to lightning than the heartwood, due to the greater amounts of moisture present in these tissues. Cases have been observed where damage has been slight because of a film of rain on the tree. In other cases, where the rain has not thoroughly wet the trunk and limbs the lightning followed the wet surfaces and then jumped to the cambium and sapwood as the course of least resistance and caused great damage to the tree.

The starch and fatty content of trees of different species may be considered a factor in lightning injury. The starchy trees (oak, poplar, maple, ash, elm) are good conductors, while oily trees (beech, walnut, birch) are poor conductors. This may partially explain the supposed greater susceptibility of the former group to lightning injury.

Protection of Trees From Lightning

Can trees actually be immunized from lightning? The answer is positively yes! Answers to questionnaires received in 1935 from over 100 commercial arborists and others interested in lightning protection indicate that something over 4,000 trees have been given this attention in the last 20 years. That these systems have given approximately 100 per cent protection is evidenced by statements indicating that none of the correctly rodded trees has been reported injured by lightning.

Although other theories have been advanced, the "Code for Protection Against Lightning," states:

"The sole purpose of lightning rods . . . is to protect . . . by conducting away the sudden stroke when it occurs, there being no evidence or good reason for believing that any form of protection can prevent a stroke."

It is recognized that there are experimental data to demonstrate the continuous discharging action of air terminals, but Prof. John Zeleny has pointed out that this discharge is in such small quantities as to have little if any real effect on lightning discharge.

Cone of Protection. A lightning protection system protects not only the tree itself but gives supplementary protection for buildings and trees overhung by the protected tree and to persons or livestock taking refuge beneath it. The radius of the protection influence has been the object of recent studies.

Peek was the exponent of the theory of the so-called cone of protection which he determined under laboratory conditions exists around each vertical lightning conductor. His experiments showed that a vertical conductor will generally divert to itself all direct hits which might otherwise fall within a cone-shaped space, of which the apex is the top of the conductor and the base a circle, of which the radius is two to four times the height of the conductor. It has been found in field practice that this cone of protection is violated in possibly 5 per cent of cases, however, and in recent years two such violations have come to the attention of the speaker. The cone of protection is an important factor in rod installations.

Reduced to fundamentals, lightning protection for a tree consists of a conductor extending from the tree top to an electrical ground in such a manner that if the system is struck the discharge will pass harmlessly into the earth without injury to the tree. This is not the whole story, however, and before installing lightning protection in a tree the following principles should be understood and considered.

1. *Materials.* Copper, aluminum and iron are satisfactory materials for lightning protection systems, but since copper is relatively free from corrosion, cheap, and an excellent conductor, its use is generally recommended over the other metals. It should be observed, however, that regardless of the material selected all parts of the system should be made of the same metal.

2. *Air Terminals.* The tree should be carefully examined and the point or points most likely to be struck selected for air terminal locations. It is axiomatic that such points should be at the highest leader or leaders of the tree. It is unnecessary to place air terminals on lateral branches where such points fall within the cone of protection, but if parts of the tree extend beyond the cone of protection they should be equipped with air terminals.

3. *Conductors.* Flexible cable is to be preferred for conductors on trees to solid bars or tubular materials. An average size tree requires only one main down conductor, but a very large tree is better protected by the use of two down conductors on opposite sides of the tree, interconnected near the top. Conductors should follow the most direct path to the ground in order to offer the least possible resistance to the passage of the discharge. Where bends are unavoidable, they should have a radius of at least eight inches and no change of direction greater than 90 degrees. Branch conductors to lateral air terminals should be equivalent in diameter and material to the main conductor cable, which should weigh not less than 187.5 pounds per 1,000 feet. The size of any wire in the cable should not be less than No. 17 A. W.G. Miniature cable is unsatisfactory for this purpose.

4. *Side Flashes.* It is good practice to use copper or copper-covered bracing materials in trees which are also protected from lightning, but if the tree has been braced mechanically with *any* kind of cable or rods, all such braces should be connected to the lightning protection system to prevent side flashes. Miniature cable, equivalent in strength and conducting cross-sectional area to a No. 6 A.W. G. copper wire, may be used for this purpose.

5. *Joints.* Joints should be as few in number as possible, mechanically strong, and of good electrical continuity. Wrapped cable joints, if 6 to 12 times as long as the diameter of the cable, are as satisfactory as clamp-sleeve joints. Soldering of joints will strengthen and also assist the electrical continuity, although this is seldom necessary. It should be noted that the common liquid or heatless solders sold in tubes are not electrical solders and should not be used.

6. *Electrolysis.* Metals which occupy different positions in the electromotive series should not be joined if it can be avoided as the electrolytic or galvanic action may injure the joints. But if unavoidable, the galvanic action may be minimized by soldering or painting the joint with a waterproof metal preservative paint.

7. *Attachments.* Copper lightning cable may be attached to the tree with copper nails. The old belief that copper nails will kill a tree has no basis in fact, and the use of materials other than copper

(*Continued on page* 17)

Arborist, Expert or What?

By A. E. STENE
State Entomologist
Providence, R. I.

There has been a rapid development during the past few years in the science and art of giving shade trees better and more intelligent care, but we are still using a number of miscellaneous more or less inappropriate terms in writing or speaking of the work as a whole or of its sub-divisions. We have no generally accepted terms for the work itself or for those who carry it on and consequently we are floundering around with such ponderous, indefinite or borrowed terms as tree expert, tree specialist, tree doctor, tree surgeon, dendrician, tree entomologist, city or town forester, shade tree care, shade tree protection, city or town forestry, etc. Not all of such terms are necessarily useless but their application should be carefully considered and definitely established by some authority such as an association of men in the business or a professional publication which chooses its terms carefully and logically.

About twenty-three years ago conferences of a number of people in Rhode Island, interested in better care of shade trees, confronted with the questionable practices of some so-called tree surgeons, who were active at that time, concluded that an attempt should be made to regulate this work in a way similar to methods used in preventing fraud among plumbers, barbers, veterinarians, etc. The drafting of an act for the State legislative assembly was proposed and the first problem confronting the drafter was that of a specific term or name for the workers to be mentioned in the act. After considerable study of dictionaries it was decided to revive a term formerly current in the English language but which had become more or less obsolete, namely, arborist. In fact, an edition of Webster's unabridged published during the present century, did place arborist among the obsolete terms at the bottom of the page. By definition, however, the word seemed to fill the bill. Webster's unabridged, the Standard Dictionary, The Century Dictionary and Sir James Murray's English Dictionary cited the root "arbor" as the year Latin word for tree. From this is derived a long list of terms among which is arborist, generally defined by American dictionaries as a student or cultivator of trees. By Murray's as a scientific student or cultivator of trees. Correspondence with a number of men competent to judge the propriety of using the term brought no other objection than that it was little used and might not be understood. It seemed to be the most appropriate word available, however, and was therefore inserted in the law and defined for the purpose of the law as any person, firm or corporation who makes a business or practice of pruning, trimming, spraying or repairing trees and the work regulated shall include such activities as are commonly included under such terms as tree surgery, tree dentistry, tree spraying, tree pruning and the work of foresters and entomologists as applied to the care of fruit, shade and ornamental trees and shrubs. It is an interesting sidelight on New England caution and conservatism that it took nearly four years before the act passed and then it was amended to remove its mandatory provisions. It was not until eight years later or in 1928 that it was changed back to its original form, providing that those that make a business of offering their services in the care of trees *shall* obtain a license to carry on their work.

The use of arborist for the worker naturally leads to the use of the word arboriculture, defined by all the standard dictionaries as the cultivation of trees and shrubs for use of ornament, for the work that he does. Adoption of these terms leads to a number of related derivatives such as arboreal, arboretum, etc., which may find appropriate use as the work develops.

These terms seem to have found increased use in recent years among the people interested in the work under consideration and if they are generally adopted it will greatly facilitate future discussions and popular understanding of the work carried on. The next step should be to adopt similarly definite terms for subordinate activities for which miscellaneous terms are used such as tree surgery, which has been employed to mean cavity filling only or, as in animal surgery, any operation involving the removal of any part of a tree. Tree protection, meaning in a limited sense protection against insects and diseases or, in a general way, the whole gamut of activities which may come under the head of arboriculture. The writer would like to renew a suggestion made some years ago before the National Tree Protection Society held in 1931 at Boyce Thompson Institute and with the Bartlett Tree Expert Company at Stamford, Connecticut, that the present National Shade Tree Conference, which quite fully represents the arboricultural interests, appoint a standing committee on nomenclature, the function of which shall be to study the different terms now used and to present from time to time for general adoption by the associations those that are suitable among older terms and also suggest new terms where they may be necessary. It is a logical expectation that arboriculture may in the not very distant future attain professional standing and a body of terms that shall be definitely established and have specific meanings is a necessary concomitant of such a development.

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Growth Features

(*Continued from page* 7)

shielded by the cap of root-tips. These primary generative cells give rise to the branches and also to the three main tracts in stems, which finally take the permanent form of pith, wood and bast. The cells of a thin layer outside the wood assume the dimensions of a fine cambric needle constituting the cambium, or secondary generative layer, the derivatives of which add a layer to the wood nearly every year as long as the tree is alive.

The properties and capacities of the cells of the primary and secondary growing masses are by no means identical, and their periods of activity during the season do not coincide. Increase in thickness of trunks by growth in the cambium layer sometimes begins before the buds open, but in other species, as in the live-oak, much elongation of twigs has taken place before enlargement of the trunk is registered by any instrument.

The seasonal program of the California live-oak probably varies throughout its range but in the Carmel region a great number of whitish root-tips denoting rapid growth, appear soon after the beginning of the autumnal rains and many continue until the following midsummer. Increase in thickness of roots by the action of the cambium begins in February, a month in advance of such action in the trunk, and continues until July, coming to an end before enlargement of the trunk which begins in March and ends in August.

Some buds may open as early as December, but a general awakening does not occur until January or February. Considerable extension of twigs takes place and the leaves have attained some size before wood-formation in the trunk begins as noted above.

After the first growth in length of twigs has come to an end and after a fortnight of non-activity, a large number of buds re-open and a secondary growth resulting in an extension which may be as great as the earlier one. These are the "Lammas shoots" of the English or the "Johannistriebe" of the Germans. Some buds which were dormant in the spring participate in this activity which generally comes to an end in September.

Secondary growth and regeneration in the cambium takes place after wounding, pruning or other damage to this layer. The resulting formation of callus may completely encircle a blaze, but if the blaze be extended to a girdle, callus forms chiefly above the cut. The formation of callus in such operations or on stumps is rapid and denuded surfaces may be covered within a season or two, a matter of importance in pruning and surgery.

The features described illustrate the fact that all organs of the tree have a capacity for rapid growth. Vigorous growth implies very active cells in the terminals, cambium and callus. Such activity is accompanied by the release of much carbon dioxide. This gas consequently accumulates in the large vessels and spaces in the trunk not filled with water. These "air-filled" spaces may occupy over one-fourth the volume of the trunk. Carbon dioxide is present in the air in only 2-3 parts per 10,000 and it is this supply that is drawn upon by the green leaves in photosynthesis.

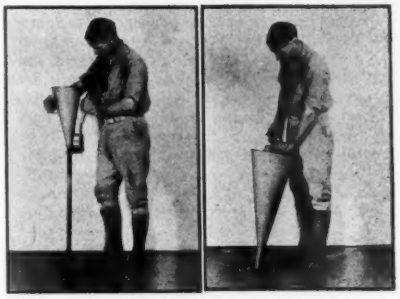
The "air" in the trunk is made up of atmospheric gases but proportions widely different from those of the atmosphere. Respiration of the living cells may release carbon dioxide so rapidly that early in the spring it constitutes 100-200 parts in 10,000, and this proportion rises irregularly with the advance of the season until the ratio is 2,600 parts in 10,000, with a balanced diminution of the oxygen. Some of the gas may be dissolved in the sap and carried up to the leaves, but the loss by this means and by passage out through the extremely minute pores though the sheathing cambium is very small. A possible protective effect is implied as parasites, plant as well as animal, would not survive, or do any serious damage in such an atmosphere.

The inception and end of growth in a trunk as well as the thickness of the new layer may be found by a registering dendrometer. The position of the pointer will indicate the amount of change at any time.

The use of the more complex dendrograph, however, is necessary to secure information as to the course of growth, of daily variations and as to the nature of the conditions which affect changes in diameter. This instrument makes a continuous inked tracing on sheets of calibrated paper, so that the observer at the end of the week, month or at the close of the season has an enduring record of the trunk. (Fig. 2.)

Records of a trunk 10 inches in diameter for the weeks beginning May 20

(*Continued on page* 17)



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Canker Worm Observations

The results of several seasons of experimental work with different spray combinations for control of the spring cankerworm and the fall cankerworm on elms along roadsides and on ornamental plantings, conducted with a view to determining the efficiency of various insecticides, are reported in table form. The fall cankerworm has not been a problem where the trees receive a four per cent application of dormant oil spray for the European elm scale before growth starts in the spring. It has been found that where trees so sprayed are banded with either cotton or Tanglefoot immediately after the spray is applied, they are not attacked by the spring cankerworm. Trees sprayed with lead arsenate three pounds, summer oil one quart, and water 100 gallons when the leaves are half-grown are not injured by either species of cankerworm.

For general purposes, lead arsenate with an oil spreader-sticker has been satisfactory. None of the 12 sprays tested caused injury to the foliage of the elm or to stands interplanted with sycamore, basswood, hawthorn, maple or boxelder. These pests are never a problem in well-sprayed orchards or where an effort is made to keep the population down, and one thorough application under average conditions will hold them in check for several years.—E. I. McDaniel, *Observations on Control of Cankerworm by Sprays, Ohio State University.*

Nectria Canker in Relation to Growth and Mortality in Basswood (Tilia americana). Growth studies were initiated in 1927 and 1928 on 10 half-acre plots in a stand consisting of 15 per cent to 20 per cent basswood. Final measurements were made 10 years later, when all trees were examined for nectria canker. Those with lesions at or near the point of diameter measurement were discarded, leaving a total of 431 trees, 151 of which bore one or more trunk cankers of various ages. The average growth for all trees for the 10-year period was 0.86 inches. Comparison with the average figure for basswood in the Lake States as given by Frothingham, 1.5 inches for a 10-year period, indicated that the trees were growing under unfavorable conditions. The average growth for the cankered trees was 1.03 inches against 0.77 for the trees not cankered. The results suggest that the more rapidly growing trees in a poorly growing stand are more likely to be cankered. During the same period, the dying of basswood in two of these plots bore no relation to nectria infection but was directly correlated with amount of shading.—D. S. Welch, in *Nursery Disease Notes (N. J.)*

Oak Mildew, a Major Disorder

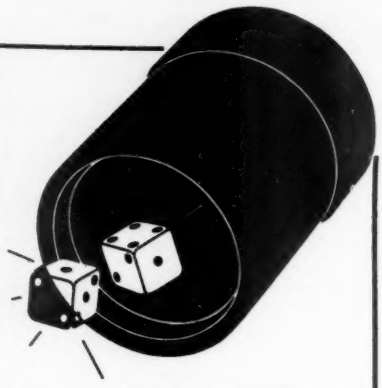
In the coastal regions of Southern California oak mildew has been, for a number of years, a persistent disorder. Of the various methods of control attempted, none has proved adequate.

Severe infections occur in trees ranging in age from nursery stock to mature specimens. Since the most susceptible foliage is the young, succulent growth, trees gradually begin to fail from defoliation. In their devitalized state they are often attacked by bark and cambium mining insects which hasten their decline.

The sparse, distorted foliage resulting from severe infections completely ruins the ornamental value of the trees.

Though the disease closely resembles *Microsphaera quercina*, pathologists have not made a positive identification. *Quercus agrifolia* is the commonest host, followed by *Quercus suber* and *Quercus virginiana* in the order as named.

W. S. Rowland, *Peck & Wadsworth Co.*



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Fifteenth National Shade Tree Conference

Chairman Norman Armstrong promises he will outshine Vance Shields in making the 15th Conference the tops. Vance did a grand job in St. Louis, so it's hard telling what the sage of White Plains has up his sleeve—that is, if he hasn't lost his shirt.

Hotel Astor will be the place and you can put a circle around August 22-23-24 as the time. The complete program will be published in the July issue of *Trees.*

Wage and Hour Bill

The wage and hour bill has been the cause of intense concentration in past weeks by the executive committee of the National Arborist Association.

The committee is laboring to have inserted in the bill wording that will classify the arborist in the same bracket as the agriculturist. The argument advanced is that the short work year, still further reduced by inclement weather, of tree workers should not be handicapped by the limited hour clauses of the bill. The tree worker can only function in fair weather.

The Association has had representatives appear before the labor committees of various State Legislatures seeking adjustments. These states are: Wisconsin, Indiana, Ohio (killed in committee), Maryland and New Jersey.

The proposed addition to the law follows:

(Proposed amendatory language *italicized*).

(i) "Agriculture" includes *horticulture,* farming in all its branches *and, among other things, includes* the cultivation and tillage of the soil, *the planting and transplanting, care and preservation of trees and plants,* dairying, the production, cultivation, growing, and harvesting of any agricultural or horticultural commodities, the raising of livestock, bees, fur bearing animals, or poultry, and any practices (including any forestry or lumbering operations) performed by a farmer or on a farm as a necessary incident to the above farming operations, including delivery from a farm to storage or to market or to carriers for transportation to market.

Lightning

(*Continued from page* 13)

for attachment of conductors should never be based on this exploded fallacy. Galvanized nails for attachment of copper conductor cable are dangerous because the resulting galvanic action has been found to kill the cambium beneath the cable and also to destroy the nails. The use of insulated fasteners for conductors should be avoided since the potentials of lightning strokes are so enormous that small insulators cannot withstand them. Then, too, it is important that nothing interfere with the free passage of the surface charge from the tree to the conductor.

8. *Ground Terminals.* When a stroke is about to take place to earth, the surrounding surface of the ground carries an electric charge for miles around. As the discharge takes place, this surface charge moves radially toward the ground end of the air path, forming an electric current in the ground. Near the point where the discharge enters the ground the current density becomes high, and if the flow takes place through a tree and its root system, the damage may be great. Ground terminals should be distributed, therefore, more or less radially about the tree *beyond* the root system, rather than on one side close to the tree. Three interconnected ground terminals should be provided for each down conductor. These should be driven into permanently moist ground, if possible, but if many rocks are encountered a network of wires just under the ground surface will provide a reasonably satisfactory ground.

9. *Maintenance.* Since a protection system should remain in working condition for a long time, strong materials and firm attachments should be used. Servicing will be necessary every three to five years, however, to extend air terminals, to check the entire system, and to replace imbedded trunk attachments.

10. *Ornamentation.* The use of fancy ornaments, special air terminals, glass balls, weather vanes, insulators, etc., is unnecessary and undesirable since they serve no useful purpose and only add to the cost. The best protection system is the simplest and least conspicuous.

Lightning Struck Tree Survey

Observations by various people have indicated that there is considerable difference in susceptibility to lightning attack among trees of different species and in different environments. It is thought that trees standing alone or above their fellows, and trees along avenues, streams and lakes are struck more frequently than others. Studies made abroad tend to show that oak, elm, pine, poplar, maple, ash and spruce are struck frequently, while beech, birch, horsechestnut and holly appear to be relatively free from lightning attack. Deep-rooted trees are generally believed to be more liable to lightning injury than those with shallow widespreading root systems, and as a general rule decayed or rotten trees are greater sufferers from lightning than sound, undecayed specimens. It is also thought that vertical air currents arising from topography changes and the prevalence of underground metallic deposits are important factors in the susceptibility of trees to lightning injury.

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Growth Features

(*Continued from page* 15)

and June 20, 1932, are reproduced in Fig. 3. It is seen that the lines are higher at the end of the week than at the beginning, denoting an increase in thickness. The rise or increase was not continuous, however. Nearly every morning about 7 to 8 a. m. a sag was registered indicating that the trunk was shrinking. This reversible contraction was more marked in June than in May. The daily contraction is due to loss of water from the heavy bark and to tension in the wood, both of which were more pronounced in the warmer weather of June. This loss in diameter did not take place on Friday, May 27, which was foggy. Similar effects result from rains.

When these records are compared with "dendrograms" of other trees, it is apparent that the shrinkages of the live-oak are slight and take place gradually, in comparison with the abrupt contractions in the pines, for example. This is a matter of some importance in the adjustment of braces, fillings, etc.

The average annual increase in the diameter of small trunks is about 6 mm. (one-fourth inch), the layer of new wood being half of this thickness. The other features of interest described in the previous paragraphs include the seasonal program in which elongation of roots is renewed with the autumn rains and continues indefinitely, while growth in thickness of these members begins in Jan-

(*Continued on page* 18)

BOOKS

A GUIDE TO FORESTRY ACTIVITIES IN NORTH CAROLINA, SOUTH CAROLINA AND TENNESSEE. Edited by Prof. William Maugham, Duke University. Order from E. V. Roberts, care Appalachian Forest Experiment Sta., Asheville, N. C. Price $1.50.

A comprehensive description of forestry activities in the three states mentioned, outlining the splendid work of the Southern Railroad, private lumber companies and, of course, the government agencies.

* * *

SAGAS OF THE EVERGREENS. Frank H. Lamb. W. W. Norton & Company, Inc., New York. 364 pp., illus. $3.50.

This splendid book will rapidly take its place in the front rank of books to read and have. Starting back with the story of the Ginkgo and by way of many far-flung ports, the story covers the giant Kauris, the Sugi, Formosa cedar; in Europe with the Stone Pine, the Deodar in the Himalayas and back home to the Sequoia. A grand book full of interest.

* * *

SOUTHERN FORESTRY. Charles N. Elliot and M. D. Mobley. Turner E. Smith and Company, Atlanta, Ga. 494 pp., illus. $1.60.

Containing factual data of great value to the Southern forester, this book will also prove to be intestimably valuable for reference and general knowledge by all foresters. Distinctly not technical, it was designed for, as one author states, "the upper elementary grade level." It should serve its purpose well.

* * *

ORNAMENTAL PLANTS FOR SUBTROPICAL REGIONS. Roland Stewart Hoyt. Livingston Press, Los Angeles, Calif. 383 pp. $3.15.

To anyone working with plants in subtropical regions this handbook is indispensable. Brought out to enlarge and improve the author's splendid "Planting Lists for Southern California," it does just that. The cross indexing, compendium and breakdown of plant uses makes this book the most useful seen in a long time.

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Growth Features

(*Continued from page* 17)

uary and is at an end by August. Some buds open in December but this takes place mainly in February and March; primary elongation of twigs comes to an end in July; after a short period of rest secondary elongation is displayed by a large number.

Three suites of leaves may be formed in a season following defoliations. This capacity for replacement is accompanied by similar capacity for vigorous growth of callus on blazes, girdles and stumps. Rapid growth releases carbon dioxide at a high rate and this gas accumulates in trunks to constitute from 1 to 26 per cent of the "air" contained, proportions unfavorable to parasites.

. . . I AM NOT AN ARBORIST, BUT AM INTERESTED IN MANY OF THE THINGS WHICH CONCERN ARBORISTS, BUT LOOKING AT YOUR MAGAZINE PURELY FROM A FORESTRY ANGLE, IT HAS A LOT OF THINGS OF INTEREST TO FORESTERS IN IT.

. . . I WAS PARTICULARLY INTERESTED IN THE ARTICLES ON THE TREATMENT OF TREE CAVITIES AND "WHY NOT MORE STATE TREES?"

. . . AGAIN I WISH TO CONGRATULATE YOU ON YOUR EXCELLENT MAGAZINE.

Sincerely,
C. H. Schaeffer,
Asst. State Forester,
South Carolina Forest Service.

* * *

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PLEASE START MY SUBSCRIPTION WITH THE ISSUE CONTAINING DR. WELCH'S ARTICLE ON CANKERS.

THANK YOU.

Sincerely yours,
Forrest C. Strong,
Res. Asst. in Plant Pathology,
Michigan State College.

* * *

I ALWAYS FIND SOMETHING NEW TO ME IN YOUR MAGAZINE. THIS LAST NUMBER IS RATHER A SHOCK IN RECORDING THE DESTRUCTION OF THAT FINE AGATHIS ROBUSTA, ON THE GROUNDS OF THE MIRAMAR HOTEL. I HAVE ADMIRED IT FOR OVER TWENTY YEARS, AND INCLUDED A PICTURE OF IT IN MY BOOK, "TREES AND SHRUBS OF CALIFORNIA GARDENS". I HOPE THE NEW ZEALAND CHRISTMAS TREE NEARBY HAS BEEN SPARED.

Charles Francis Saunders,
Pasadena, California.

Ed's Note: The N. Z. Xmas tree escaped.

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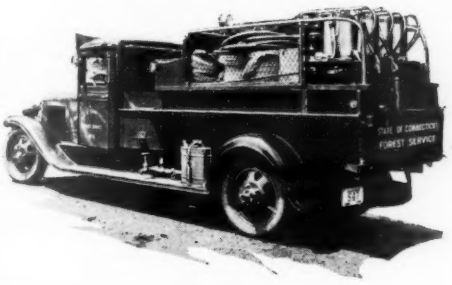

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with the famous "Universal" Insecticides and Fungicides

For many years Shell Oil Company has been supplying the base petroleum products for Balfour Guthrie and Company's famous "Universal" spray oils — so long considered a standard of quality in the West.

Shell recently acquired the spray oil interests of Balfour Guthrie and Company and is now manufacturing the full line of "Universal" sprays. You can secure any of these by phoning the nearest Shell office. Users will find no change in these trustworthy products — except that the name, "Universal," now carries the prefix "Shell."

Shell's entrance into the spray oil field brings to arboriculture in its fight against insects and fungi this unusual combination: Unmatched facilities for producing insecticides and fungicides to the most precise formulas . . . a staff of expert entomologists headed by internationally recognized men . . . Shell's world-wide resources for scientific research. Together, these factors are now working to develop new and better ways to control arboricultural pests.

For advice on infestation problems, phone nearest Shell office. Or write in detail to Shell Spray Oil Dept., Shell Building, San Francisco or Los Angeles.

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